

ENSURING SYSTEM SUCCESS

Envision the entire project from the outset. Failure to take into account the entirety of your project can create unnecessary expense, unnecessary labor, and an imperfectly designed system.

Early on, spend most of your time understanding what power you need and how the electrical power system you select will meet these needs. Think about where you will put the system: how will it look, sound, or smell; what are its safety and security issues; how will you take care of it?

There are several things to keep in mind – no matter what type of electrical power system you choose. The first of these is to realize that there are choices – engines, solar, extension of electrical lines. Each option has value. Each option has costs. Consider them all as you envision your entire project.

The **Solar Way: Photovoltaics on Indian Lands** presumes that after this thoughtful approach to your power needs, you have chosen the power of the sun.

So how should you begin the process of considering solar electricity? Begin with the knowledge that PV systems are used for almost anything you can think of throughout Indian country, as you've seen within the pages of this book. It's not a question of whether or not a solar electric system can do the job – it can. Now various approaches to the project come into play.

▼ Envision your entire project. Seen here is a residential system in the White Rock/Naschitti area of New Mexico. (Photo courtesy Navajo Housing Services Department)



50 The Solar Way

▼ Consider how the system will look. This is a striking example of artistic design elements integrated into a PV installation at the Indian Pueblo Cultural Center, Albuquerque, New Mexico. (Photo courtesy Sandia National Laboratories)



You've chosen a system that is quiet. Its only fuel is the power of the sun. And it requires little routine maintenance. Your PV system may cost more than an engine – but it may cost far less than a line extension. You've chosen solar because you have considered not only the initial cost, but its operational costs over the life of the system. You've considered benefits that cannot be accurately calculated, such as the benefit of a soundless system to your quality of life, the benefit of a non-polluting system, and the value of using renewable energy resources.

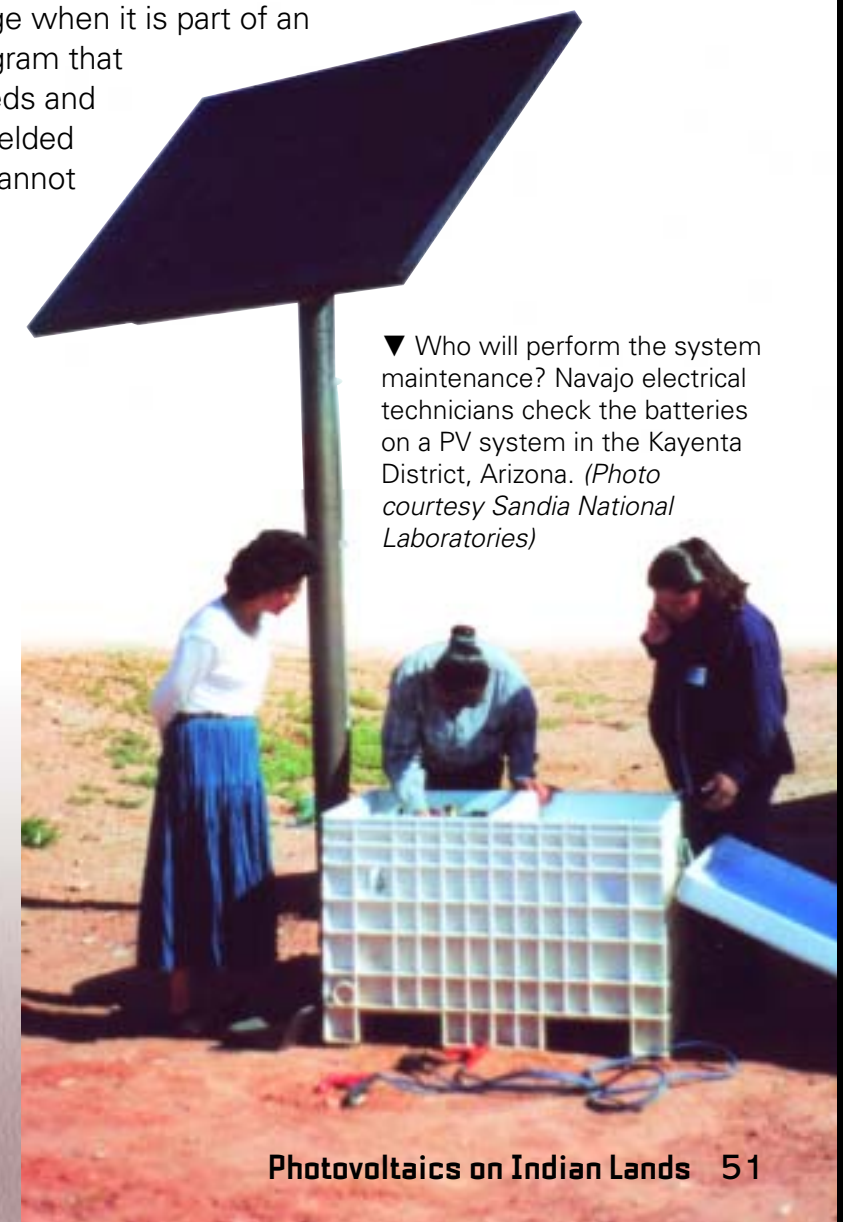
Consider the solar energy supply system together with the pump, or the lights, or any load you will power. For example, a water pump will use on-site generation when no other electrical service is available – so the electrical supply (the PV system) becomes part of the cost of pumping water.

A WORD ABOUT PV AND ENERGY CONSERVATION

Drawing power from the sun for your energy needs makes sense for all the reasons illustrated in this book, but PV is used to its best advantage when it is part of an overall energy conservation program – a program that matches System Design with Customer Needs and one that promotes wise energy use. Many fielded systems are designed so that components cannot be damaged. This means that over-use and overloading cause temporary outages while the PV system regenerates itself without system damage. Proper system operation extends the system's life. **The Solar Way** is intended to help tribes make informed decisions about photovoltaics and help PV customers make informed decisions about how to use their systems to the fullest benefit for the longest period of time. Now



◀ Consider all the benefits that solar electricity can provide. A Sandia National Laboratories staff member explains photovoltaics and what can be expected from a system to a Yurok tribal member. (Photo courtesy Sandia National Laboratories)



▼ Who will perform the system maintenance? Navajo electrical technicians check the batteries on a PV system in the Kayenta District, Arizona. (Photo courtesy Sandia National Laboratories)

you're ready to see if there are local businesses that can help you buy a system and get it properly installed. Affordability may be an issue at this time. Really simple system packages such as for area lighting or electric fencing are almost off-the-shelf, have set prices, and are easy to install. Other projects will require custom design and assembly. It is these systems that benefit most from the expertise that the local PV industry, electricians, engineers and architects, and energy consultants can provide.

If your tribe will be responsible for operating the PV system, consider all the operational costs that will be involved, and consider the investment in training staff, and the value of training customers or those who will actually be using the system. How will your systems be maintained? For larger systems, it may be advisable to purchase an extended warranty from a qualified business. For smaller systems, a warranty may also be desired, and it would be our recommendation that for ease of operation and maintenance, this 'after-sales assistance' be purchased from your system supplier. Other considerations such as cleaning or weeding can be performed by nearly anyone.

What about financial considerations? A project involving solar electric power should not necessarily be presented to potential lenders any differently than one incorporating a conventional power system. Take advantage of solar 'set-aside funding' where it exists, and consider any innovative approaches to environmental or resource management your project allows when selling the idea to a funding agency or lender.

What about technical assistance? Sandia National Laboratories and its partners can help, as can the overall PV industry and the system integrators, installers and consultants. But to ensure sustainable projects – those that will survive best the test of time – your tribe should develop its own internal expertise, its own infrastructure, and its own commitment to solar electricity.



A sustainable project on the Cuyapaipe Reservation, California. Shown are the system as it was installed by the Indian Health Service in 1978, and today (top photo), still powering a village water system. (Photos courtesy Cuyapaipe Tribe and Sandia National Laboratories)

We have presented solar as an enabling technology. But the technology is only part of the story. The rest of the story is the user and how the system is used.

Using photovoltaics means looking at things in a new way, which is really a very old way. Solar and geothermal greenhouses provide opportunities for economic development through increased output from the land and reduction of water consumption. Solar electric systems on homes and businesses complement the use of natural lighting to reduce the use of expendable resources and pollution. The wind – another solar resource – can be used with PV systems to provide more consistent power output.

These concepts need to be stressed in our educational efforts. They fit easily with even conventional classroom and laboratory programs for children and adults. Community support is important. All the education in the world means little until it is applied. As solar projects increase, support businesses can develop, and more high tech sales and service job opportunities can become available. Ultimately, it is these people who will champion the solar way and become the key to sustainable solar development.



Advocates - and future PV advocates!



Photos courtesy Hopi Foundation (upper right); Center for Permaculture as Native Science (bottom); Sandia National Labs (upper left).